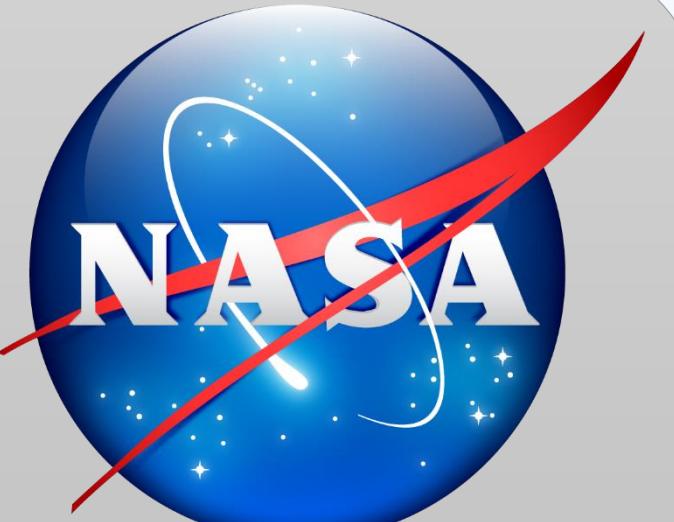




Overview of the Gen-2 3.7m HIAD Static Load Test Series

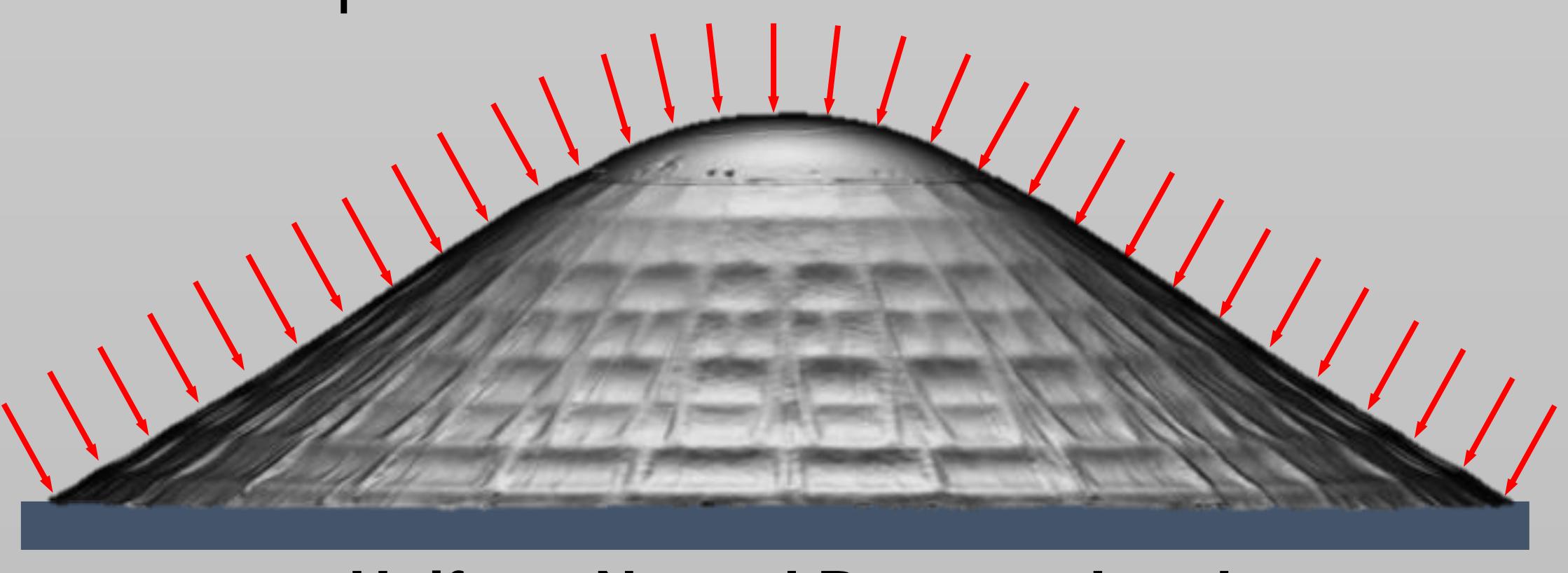


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¹ERC Inc @ NASA ARC, ²STC Corp @ NASA ARC, ³NASA LaRC, ⁴NASA ARC, ⁵Airborne Systems



Why Static Load Testing?

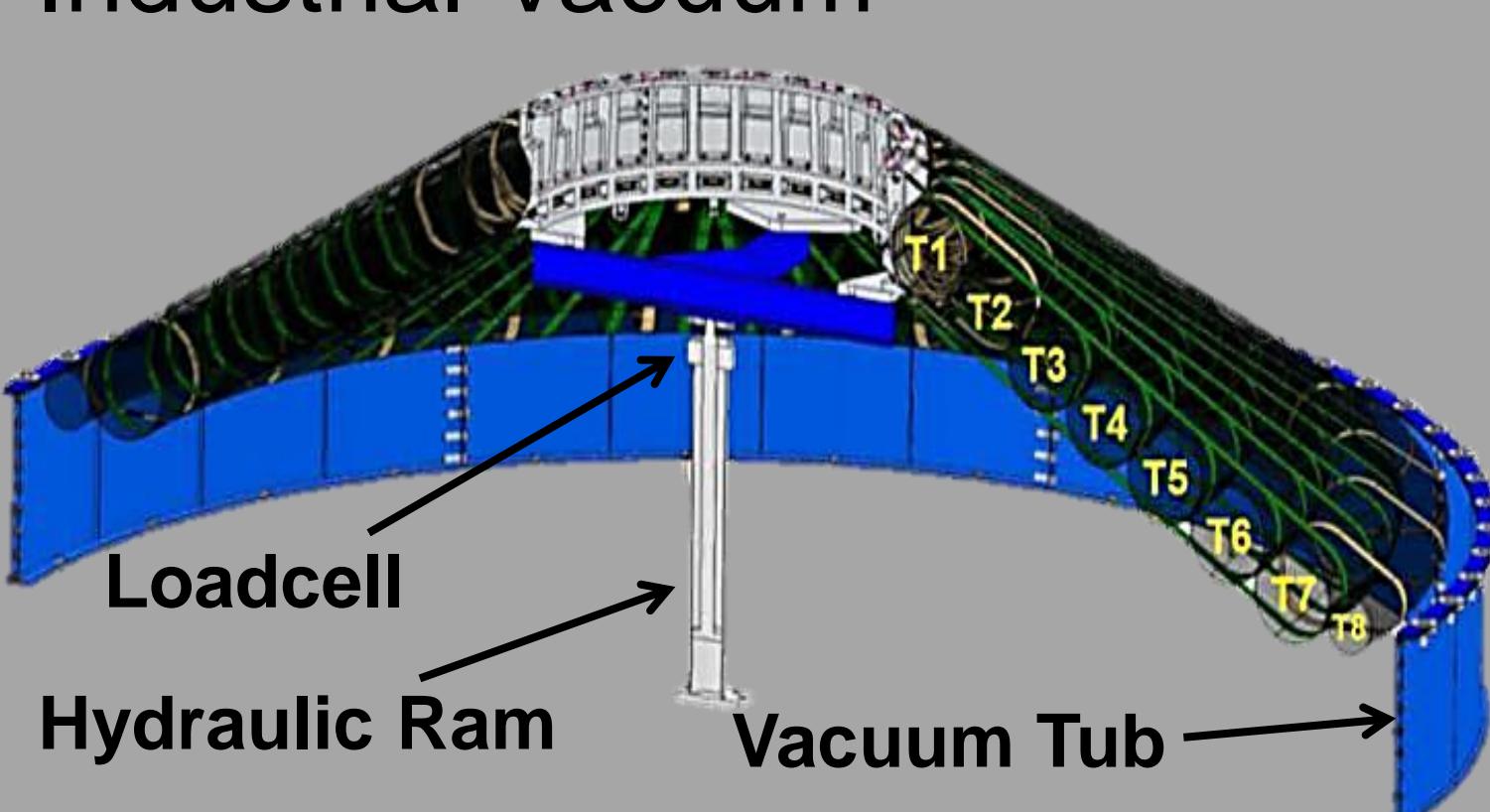
- Demonstrate structure maintains acceptable shape under load
- Demonstrate structure robustness to max loading conditions
- Experiment with different layouts and inflation conditions to determine the acceptable lowest mass inflation state
- Inexpensive compared to alternative structural tests



Uniform Normal Pressure Load

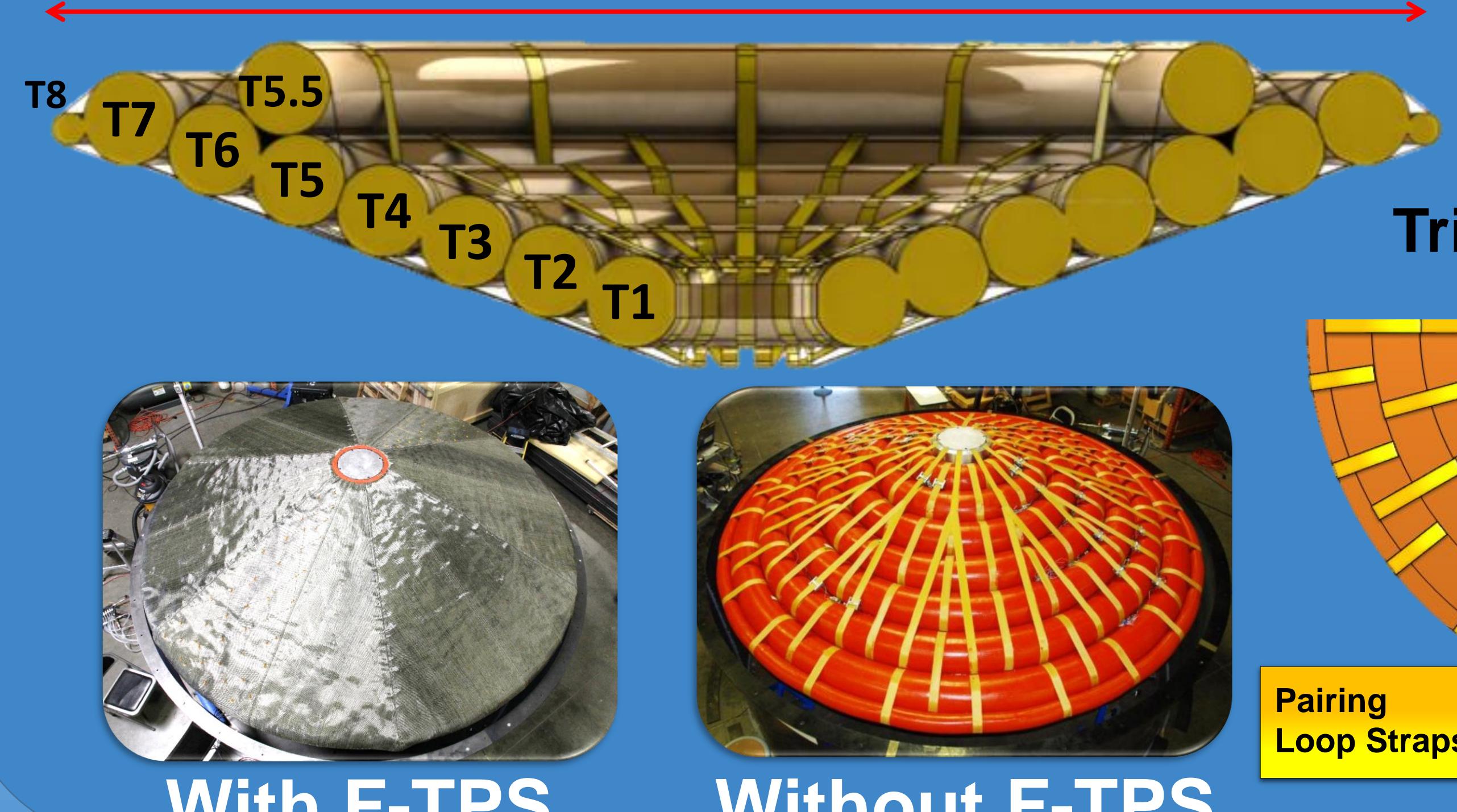
Static Load Test Setup

- Vacuum Fixture (Tub)
- Hydraulic Ram & Cross Member
- Slip Sheet & Vacuum bag
- 50,000lb Loadcell & Manometer
- Industrial Vacuum



Gen-2 HIAD Test Article

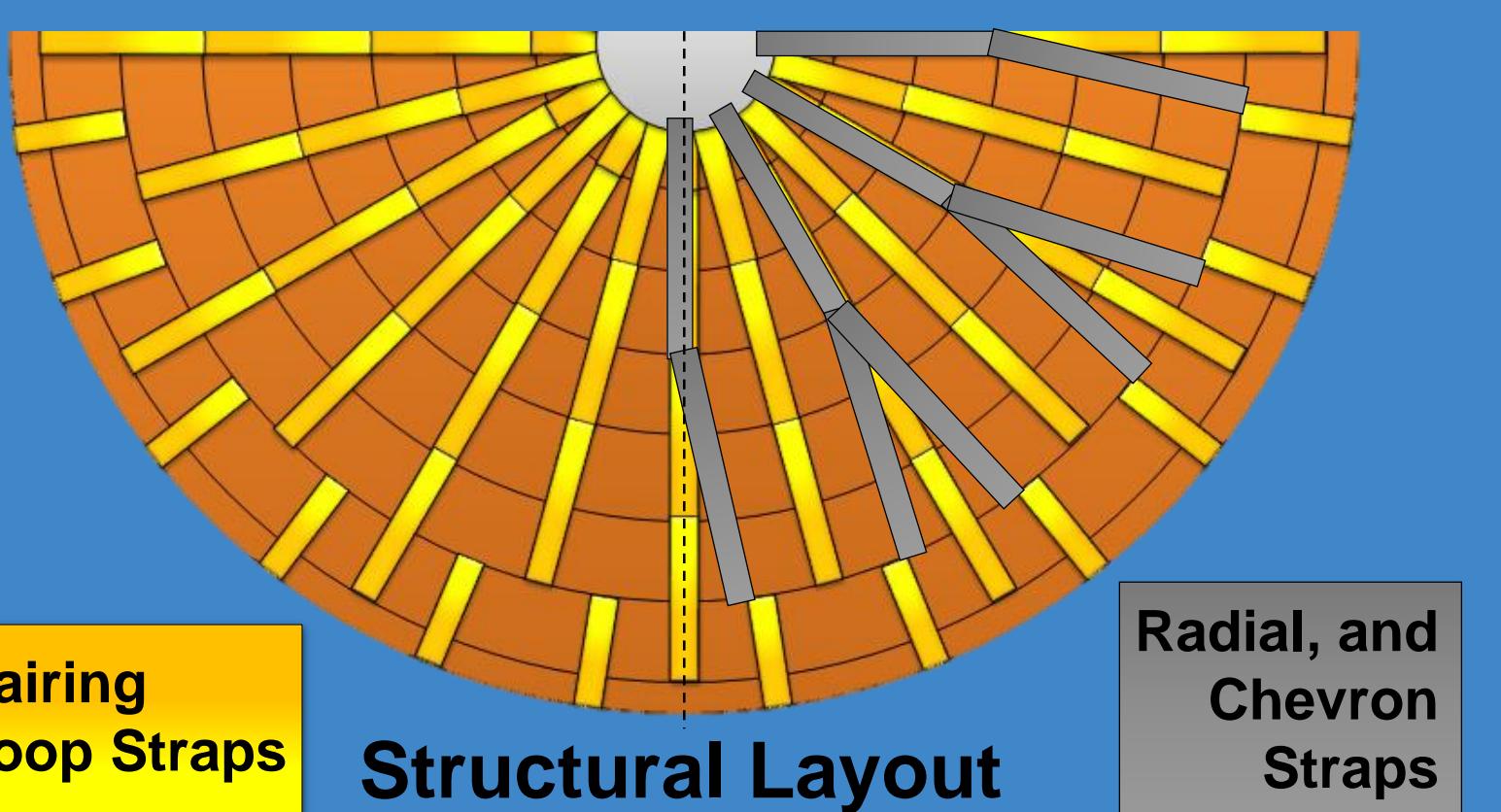
3.7 meters



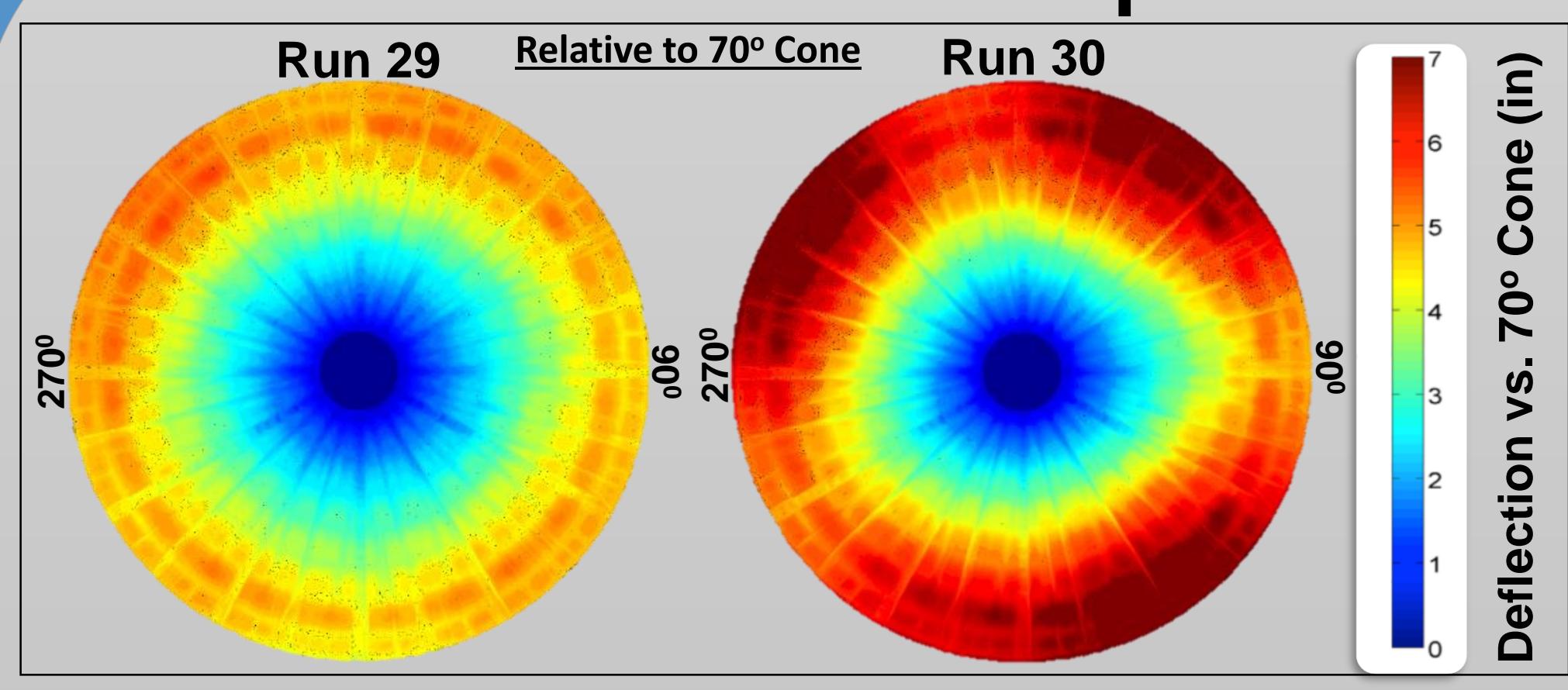
With F-TPS

Without F-TPS

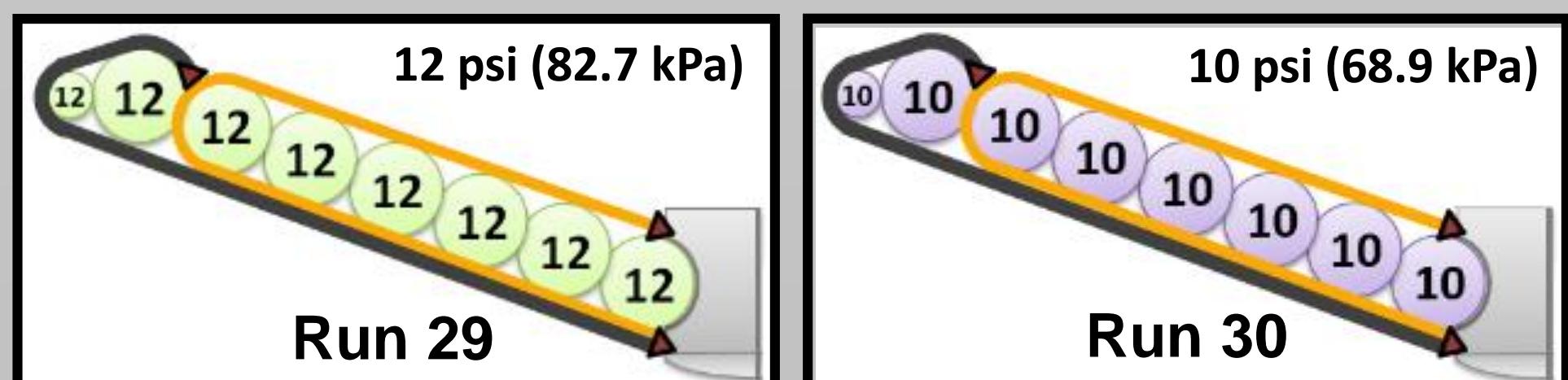
Material: Zylon
 Cone-Angle: 70 Deg
 Coating: RTV
 Liner: Urethane
 Tri-Torus: T5.5 (removable)



Inflation Pressure Comparison



- 12 psi: Uniform Deflection Under 10,000lb Load (Run 29)
- 10 psi: Aeroshell Begins Asymmetric Deflection (Run 30)

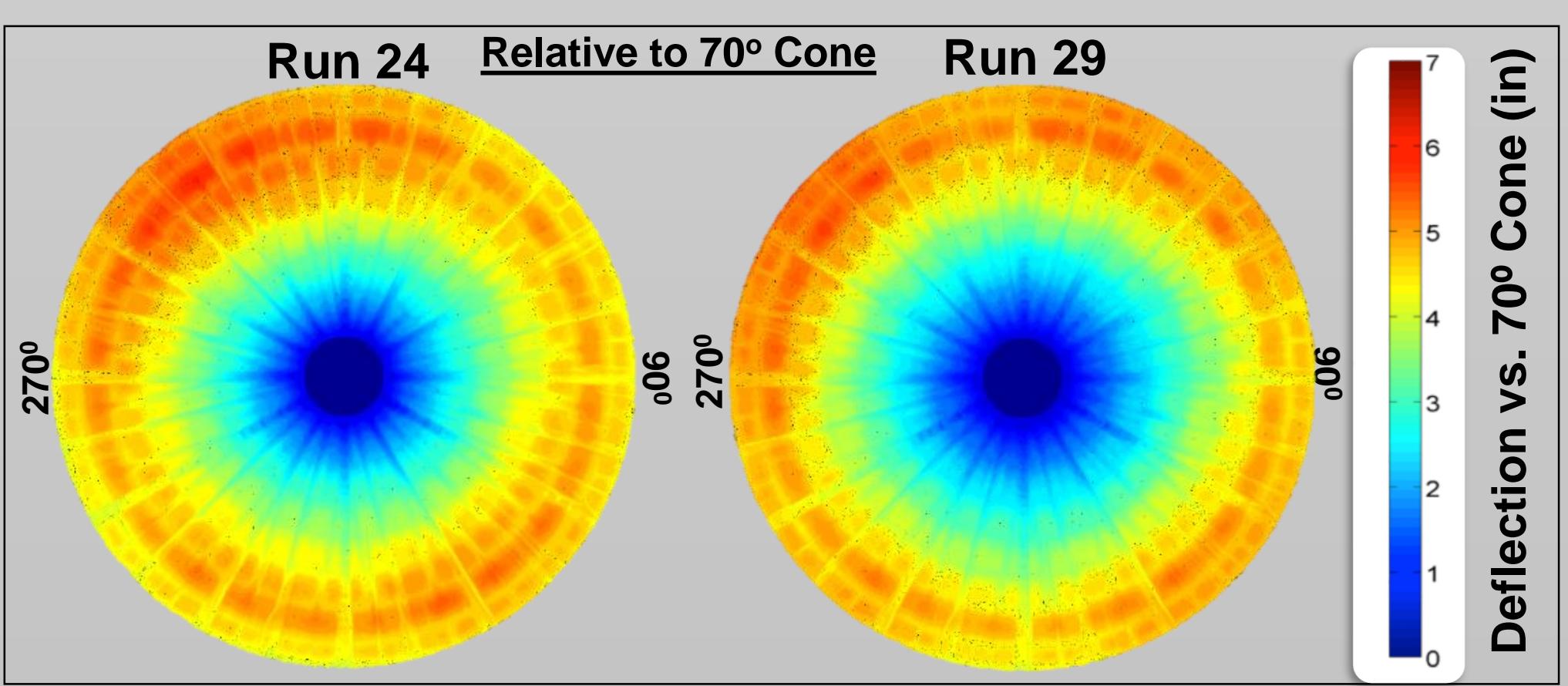


Run Configuration

Example Test Results

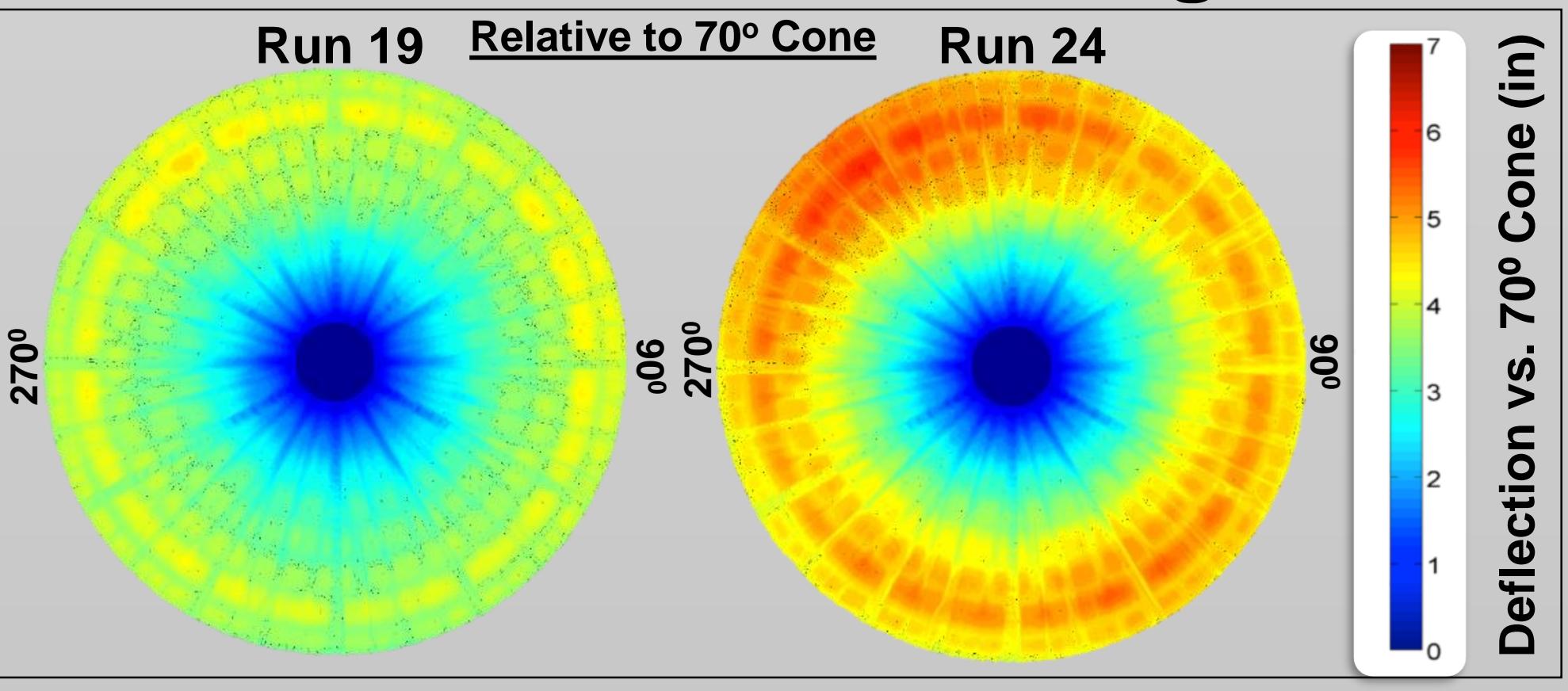
Chevron Webbing Termination

- Centerbody Chevron Termination: Slight Deflection Reduction, Pairing Loop Load Reduction (Run 29 vs 24)

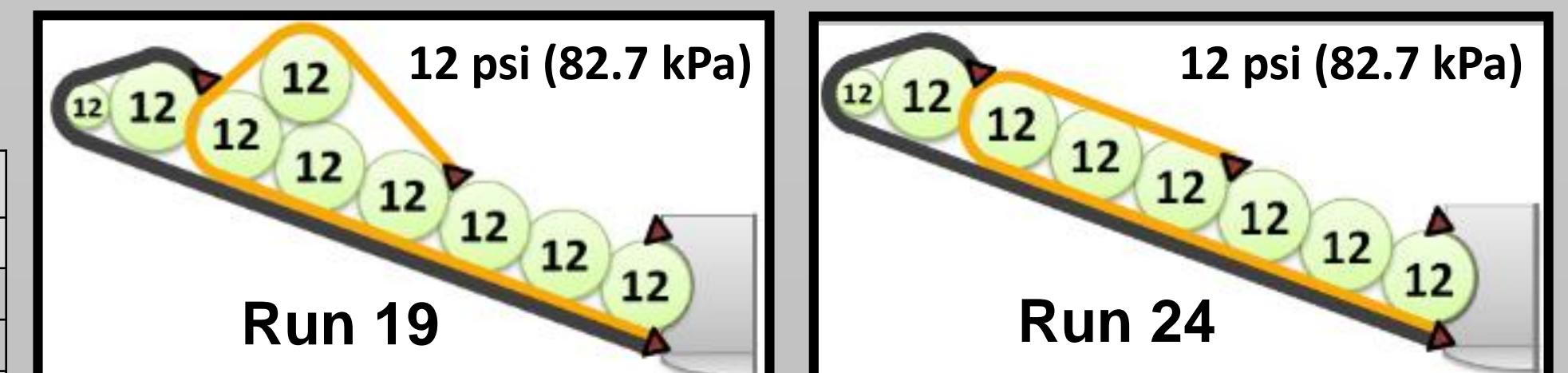


Run	R	CF	T1/T2	T2/T3	T3/T4	T4/T5	T5/T6	T6/T7
Run 24	458	210	164	170	173	137	2	-12
Run 29	411	186	126	127	129	99	111	-27
Diff (lbs)	-46	-24	-38	-43	-44	-75	-26	-58
%Change	-10.1	-11.5	-23.2	-25.5	-25.5	-43.1	-18.9	-54

Tri-Torus vs. Baseline Configuration



- With Tri-Torus: Less Deflection by ~2in (Run 19)
- Baseline (No Tri-Torus): Less Shoulder Stiffness (Run 24)



Run Configuration

Conclusions and Future Work

- Aeroshell performs well at 10,000lbs (~4,500kg) of load with an inflation pressure of 12 psi (82.7 kPa)
- Alternate chevron termination reduces load In inflatable structure
- Tri-Torus increases rigidity of structure, but decreases volume & mass efficiency
- Develop and test 15m class Gen-2 HIAD aeroshell
- Perform pack and deploy testing on Gen-2 HIAD aeroshell
- Conduct greater Zylon environmental testing to fully characterize current system and document limitations

Static Load Test Team



Laser Scan 3D Point Cloud